

**FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT**



U.S. Department of Energy

**Office of Science
Office of Fusion Energy Sciences**

**National Spherical Torus Experiment
Innovative Measurements of
Spherical Torus Plasmas**

Funding Opportunity Number: DE-PS02-08ER08-29

Announcement Type: Initial

CFDA Number: 81.049

ISSUE DATE: August 21, 2008

PREAPPLICATION DUE DATE: Not Required

LETTER OF INTENT DUE DATE: September 4, 2008 (Required)

APPLICATION DUE DATE: September 25, 2008, 8:00 p.m. Eastern Time

Note: A 2nd correction was made to this document on:

PART IV – APPLICATION AND SUBMISSION INFORMATION

C. CONTENT AND FORM OF APPLICATION – SF 424 (R&R)

5. EPACT Representation file – This paragraph was removed. The EPACT Representation form is no longer required.

Note: A correction was made to this document on Page 13, Part III Eligibility Requirements:

PART III - ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS.

All types of applicants are eligible to apply, except other Federal agencies, Federally Funded Research and Development Center (FFRDC) Contractors, and nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995.

Funding under this Notice is limited to supporting research activities based in the U.S., though subcontracts with limited funding for collaborators outside the U.S. may be allowed with appropriate justifications. To be considered for funding, applicants must have discussed their proposed research with the NSTX National Research Program Leaders and must include a Record of Discussion that specifies the benefits of proposed research to the NSTX research program and the interface support required to carry it out.

B. COST SHARING

Cost sharing is not required.

C. OTHER ELIGIBILITY REQUIREMENTS

Section 2306 of the Energy Policy Act of 1992 (EPACT) [42 U.S.C. 13525] imposes certain eligibility requirements on awards made under this program. In order to make an award to an applicant that is a business entity, other than a non-profit organization of the type described in section 501(c)(3) of the Internal Revenue Code of 1954, DOE must determine that the applicant's participation will be in the economic interest of the United States and that the applicant is either a U.S. owned company or is incorporated or organized under the laws of any State and that its parent company is incorporated or organized under the laws of a country that affords: (1) to U.S. owned companies opportunities comparable to those afforded to any other

company to participate in government-supported joint ventures in energy research and development and in local investment opportunities; and (2) adequate and effective protection for intellectual property rights of the U. S. owned companies. Eligible applicants must be able to meet these two tests. (See Section IV.C for submission of EPACT Representation.)

NOTE: REQUIREMENTS FOR GRANTS.GOV

Where to Submit: Applications must be submitted through Grants.gov to be considered for award. You cannot submit an application through Grants.gov unless you are registered. Please read the registration requirements carefully and start the process immediately. Remember you have to update your CCR registration annually. If you have any questions about your registration, you should contact the Grants.gov Helpdesk at 1-800-518-4726 to verify that you are still registered in Grants.gov.

Registration Requirements: There are several one-time actions you must complete in order to submit an application through Grants.gov (i.e., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), register with the credential provider, and register with Grants.gov). See <http://www.grants.gov/GetStarted>. Use the Grants.gov Organization Registration Checklist at <http://www.grants.gov/assets/OrganizationRegCheck.doc> to guide you through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants, who are not registered with CCR and Grants.gov, should allow at least 21 days to complete these requirements. It is suggested that the process be started as soon as possible.

IMPORTANT NOTICE TO POTENTIAL APPLICANTS: When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e. Grants.gov registration).

MICROSOFT VISTA AND OFFICE 2007 COMPATIBILITY: Grants.gov is currently incompatible with both the new Microsoft (MS) Vista Operating System and the new Microsoft (MS) Office 2007 versions of Word, Excel and Power Point. In order to create and submit your application to Grants.gov, you must find a computer with a previous version Microsoft Operating System, such as Windows XP.

If you attach a file created using MS Office 2007, you will not get an error message when you submit the application, HOWEVER your entire application will not be able to be processed or accepted at Grants.gov and will not reach DOE. Grants.gov can accept applications with attachments created in MS Office 2007 if the attachments are saved in the prior format. See www.grants.gov/www.grants.gov/assets/Vista_and_office_07_Compatibility.pdf for detailed instructions on how to do this. A file created in MS Office 2007 can be identified by the "x" at the end of the file extension, for example "sample.docx" for a Word file. Contact Grants.gov at 1-800-518-4726 with any questions.

Questions: Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. Part VII of this announcement explains how to submit other questions to the Department of Energy.

Application Receipt Notices: After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of five e-mails. It is extremely important that the AOR watch for and save each of the e-mails. It may take up to two (2) business days from application submission to receipt of e-mail Number 2. When the AOR receives e-mail Number 5, it is their responsibility to follow the instructions in the e-mail to logon to IIPS and verify that their application was received by DOE. The titles of the five e-mails are:

Number 1 – Grants.gov Submission Receipt Number

Number 2 – Grants.gov Submission Validation Receipt for Application Number

Number 3 – Grants.gov Grantor Agency Retrieval Receipt for Application Number

Number 4 – Grants.gov Agency Tracking Number Assignment for Application Number

Number 5 – **DOE e-Center Grant Application Received**

The last e-mail will contain instructions for the AOR to register with the DOE e-Center. If the AOR is already registered with the DOE e-Center, the title of the last e-mail changes to:

Number 5 – **DOE e-Center Grant Application Received and Matched**

This e-mail will contain the direct link to the application in IIPS. The AOR will need to enter their DOE e-Center user id and password to access the application.

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PART 1 – FUNDING OPPORTUNITY DESCRIPTION

The technical contact/program manager for this program is:

Dr. Stephen Eckstrand, Office of Fusion Energy Sciences, SC-24.2

PHONE: 301-903-5546

FAX: 301-903-4716

E-MAIL: Steve.Eckstrand@science.doe.gov

STATUTORY AUTHORITY

Public Law 95-91, US Department of Energy Organization Act

Public Law 109-58, Energy Policy Act of 2005

APPLICABLE REGULATIONS

U.S. Department of Energy Financial Assistance Rules, codified at 10 CFR Part 600

U.S. Department of Energy, Office of Science Financial Assistance Program Rule, codified at 10 CFR Part 605

SUMMARY:

The Office of Fusion Energy Sciences (OFES) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving applications for collaborative research employing innovative diagnostic instruments on the National Spherical Torus Experiment (NSTX) at Princeton Plasma Physics Laboratory. The NSTX program addresses two of the long term goals of the OFES program: **Configuration Optimization** and developing a **Predictive Capability for Burning Plasmas**. Applications for collaborative research must support the NSTX Program by addressing key scientific issues related to these goals, such as Macroscopic Stability, Multi-Scale Transport Physics, Plasma Boundary Interfaces, Waves and Energetic Particles, and Start-up, Ramp-up and Sustainment without a Solenoid, and Integration of Physics and Operational Requirements for Achieving Burning Plasma Conditions. To be considered for funding, applicants must have discussed their proposed research with the NSTX National Research Program Leaders and must include a Record of Discussion that specifies the benefits of proposed research to the NSTX research program and the interface support required to carry it out. Applications to renew on-going NSTX collaborative research must include a list of project goals from the previous statement of work and a summary of the actual accomplishments.

SUPPLEMENTARY INFORMATION:

The NSTX is a major facility designed to study the physics of fusion plasmas confined in a very low aspect-ratio Spherical Torus (ST) configuration. The long-term programmatic goals of the NSTX program are to evaluate the potential of a compact ST configuration, such as a Component Test Facility (CTF), to be a cost-effective element in the development of practical fusion power and to contribute to resolving important issues in predicting the physics of burning plasmas anticipated in ITER. This addresses two of the long term goals of the OFES program:

Configuration Optimization and developing a Predictive Capability for Burning Plasmas. ITER participation and a CTF are included in the USDOE 20-year strategic plan for the Fusion Energy Sciences Program (http://www.sc.doe.gov/bes/archives/plans/SCSP_12FEB04.pdf). In support of the above goals, the scientific objective of the NSTX is to understand the physics of the ST, which is characterized by strong magnetic field curvature and high toroidal beta (the ratio of the average plasma pressure to the applied toroidal magnetic field pressure) due to its very low aspect ratio. These unique properties extend and complement the normal aspect ratio tokamak in addressing several overarching scientific issues in magnetic fusion energy science. These issues are defined by the 2005 Fusion Energy Sciences Advisory Committee (FESAC) Priorities Panel report (http://www.ofes.fusion.doe.gov/more_html/FESAC/PP_Rpt_Apr05R.pdf) and can be organized into the following topical areas: Macroscopic Stability, Multi-Scale Transport Physics, Plasma Boundary Interfaces, Waves and Energetic Particles, and Start-up, Ramp-up and Sustainment without a Solenoid, and Integration of Physics and Operational Requirements for Achieving Burning Plasma Conditions.

More detailed information on the NSTX program is available in the peer reviewed five-year research program for NSTX starting in FY 2009, which is available at http://nstx.pppl.gov/DragNDrop/Five_Year_Plans/2009_2013/.

An NSTX Program Letter providing updated information on the NSTX research priorities and collaboration opportunities during the next three years, based on the advice of the NSTX Program Advisory Committee, will be available on August 27 at http://nstx.pppl.gov/nstx/NSTX_Program_Letters/.

Research on NSTX is carried out by a national research team, which includes scientific personnel from many of the leading U.S. fusion research institutions. Researchers from outside of PPPL are involved in nearly all areas of research on NSTX. The following research areas are included in this solicitation.

- I.** Macroscopic Stability
- II.** Transport and Turbulence
- III.** Boundary Physics
- IV.** Waves and Energetic Particles
- V.** Solenoid-free Plasma Start-up, Ramp-up, and Sustainment

The following sections provide a brief description of the high-priority research topics in each research area in the NSTX Program during FY 2009-2011, the time frame for which collaborative research proposals are being solicited.

NSTX Research Priorities for FY 2009-2011

The major NSTX research goals for FY 2009-2011 are provided below grouped by scientific area:

I. Macroscopic Stability - role of magnetic structure in plasma confinement and the limits to plasma pressure in sustained magnetic configurations.

I-1. *Determine the physics of Resistive Wall Mode (RWM) stabilization, by both passive and active means, and apply this understanding to reliably sustain high-beta low-aspect-ratio plasmas.*

I-2. *Study the impact of low aspect ratio, high beta, large ion gyro-radius, and strong flow shear on classical and neoclassical tearing mode stability.*

I-3. *Characterize the effects of disruptions at low aspect ratio and high beta by measuring halo currents, and thermal and current quench characteristics.*

I-4. *Develop understanding of non-axisymmetric field induced plasma viscosity for both resonant and non-resonant fields, and apply results to optimize error field correction and for rotation profile control.*

NOTE: For I-4 above, plasma rotation modification by 3D fields also impacts the transport and turbulence and boundary physics scientific areas of NSTX

II. Transport and Turbulence - physical processes that govern the confinement of heat, momentum, and particles in plasmas.

II-1. *Determine the modes (low-k, high-k, electrostatic, electromagnetic, Alfvénic) responsible for causing anomalous electron transport.*

II-2. *Determine the role of low-k turbulence in causing anomalous ion energy and momentum transport, and understand the influence of plasma rotation on low-k and high-k turbulence.*

II-3. *Determine the relationship between observed particle and impurity transport and measured and simulated micro-turbulence.*

III. Boundary Physics - interface between fusion plasma and its lower temperature plasma-facing material surroundings.

III-1. *Measure and understand the impact of a liquid lithium divertor (LLD) on particle control, energy confinement, and H-mode pedestal transport and stability. Further, analyze the LLD surface characteristics and the interactions between the LLD and the edge plasma, including the transport of lithium from the edge to the core under both steady-state and transient edge conditions.*

III-2. *Characterize the parallel and cross-field transport of heat and particles in the Scrape-Off-Layer (SOL), and understand the linkage between SOL transport and turbulence and the peak heat flux to the divertor.*

III-3. *Understand the H-mode pedestal characteristics that provide access to small ELM and ELM-free regimes in the ST, and understand how boundary modifications including plasma shaping, 3D fields, and lithium impact pedestal transport and ELM stability.*

IV. Waves and Energetic Particles - use of electromagnetic waves and energetic particles to sustain and control high-temperature plasmas.

IV-1. *Study and optimize high-harmonic fast-wave (HHFW) heating and current drive in deuterium H-mode plasmas, with emphasis on understanding and minimizing surface wave excitation and interactions between the HHFW and Neutral Beam Injection (NBI) fast ions.*

IV-2. *Study the range of observed energetic-particle-driven instabilities (for example Toroidal Alfvén Eigenmode (TAE) avalanches) and their possible role in redistribution of neutral-beam-driven current,*

IV-3. *Measure and understand Electron Bernstein Wave (EBW) emission from over-dense plasmas with emphasis on maximizing mode conversion efficiency by minimizing collisional damping and conversion efficiency fluctuations.*

V. Solenoid-free Plasma Start-up, Ramp-up, and Sustainment - physical processes of magnetic flux generation and sustainment.

V-1. *Develop and characterize efficient plasma current start-up utilizing techniques such as coaxial helicity injection, plasma guns, and poloidal-field ramp-up incorporating the impact of increased divertor pumping and increased ECH pre-ionization and heating power.*

V-2. *Assess non-inductively-driven plasma current ramp-up utilizing high-harmonic fast-wave heating and current-drive with increased RF power and with improved resilience to variations in plasma edge density.*

V-3. *Assess the impact of reduced density and collisionality and Lithium on discharges with high non-inductive current fraction – in particular changes in the neutral beam current drive efficiency, core and pedestal confinement and stability, edge bootstrap current density, and plasma impurity content*

Program Funding

It is anticipated that up to \$1.4 million from DOE/OFES will be available for new collaborative research awards during FY 2009, contingent upon the availability of funds. Multi-year funding of grant awards is expected, with out-year support contingent upon the availability of appropriated funds in future years, progress of the research, and continuing program need. It is expected that up to eight awards will be made, depending on the size of the awards. Most awards will be for three years and will range from \$100,000 to \$330,000 per year (total costs). DOE is under no obligation to pay for any costs associated with preparation or submission of applications.

Collaboration

Because NSTX is a collaborative national program, all applicants must collaborate with researchers from other institutions who are part of the NSTX National Research Team, which includes researchers from Princeton Plasma Physics Laboratory, industry, universities, and other DOE National Laboratories, as appropriate. Thus, applications submitted in response to this notice must include a Record of Discussion indicating the benefits of proposed research to the planned NSTX research program, the interface support required by the proposed collaborative work, and a description of how the proposed work will be integrated into the overall NSTX program.

In addition, applications for research projects involving multiple outside institutions, such as universities, industry, and non-profit organizations, will be considered under this Announcement. Applications submitted from different institutions, which are directed at a single research activity, should clearly indicate they are part of a proposed collaboration and contain a brief description of the overall research project. However, each application must have a distinct scope of work and a qualified principal investigator who is responsible for the research effort being performed at his or her institution. Further information on preparation of collaborative applications may be accessed via the Internet at: <http://www.science.doe.gov/grants/Colab.html>.

Applicants are asked to use the following ordered format:

- **Project Abstract Page**; single page only, should contain:
 - Title
 - PI name
 - Abstract text should concisely describe the overall project goal in one sentence, and limit background/significance of project to one sentence. Short descriptions of each individual aim should focus on what will actually be done.
- **Budget pages** for each year and a summary budget page for the entire project period.
- **Budget Explanation**
- **Background and Recent Accomplishments** (recent accomplishments subsection is mandatory for renewal applications, but optional for new applications)
- **Project Description, 20 pages or less**, exclusive of attachments. Applications with Project Descriptions longer than 20 pages will be returned to applicants and will not be reviewed for scientific merit. The project description should be a clear statement of the work to be undertaken and should include: objectives for the period of the proposed work

and expected significance; relation to the longer-term goals of the NSTX project; and relation to the present state of knowledge in the field. The statement should outline the general plan of work, including project scheduled, milestones and deliverables, and an adequate description of methods and procedures.

- **Literature Cited**
- **Biographical Sketches** (please limit to 2 pages per senior investigator)
- **Facilities and Resources** description
- **Current and Pending Support** for each senior investigator
- **Letters of Support** from (unfunded) collaborators (if applicable)

Please do not submit general letters of support as these are not used in making funding decisions.

PART II – AWARD INFORMATION

A. Type of Award Instrument

DOE anticipates awarding grants under this Program Announcement.

B. Estimated Funding

Program Funding

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C. MAXIMUM AND MINIMUM AWARD SIZE.

See B. Estimated Funding section above.

D. EXPECTED NUMBER OF AWARDS.

See B. Estimated Funding section above.

E. ANTICIPATED AWARD SIZE.

See B. Estimated Funding section above.

F. PERIOD OF PERFORMANCE.

See B. Estimated Funding section above.

G. TYPE OF APPLICATION.

DOE will accept new and renewal applications under this Announcement. Renewal applications compete with all other applications. In preparing a renewal application, applicants should assume that reviewers will not have access to previous applications. The application should be developed as fully as though the applicant were applying for the first time and include all the information required for a new project. Applications to renew on-going NSTX collaborative research must include a list of project goals from the previous statement of work and a summary of the actual accomplishments. DOE will accept new and Renewal applications under this Announcement.

PART III - ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS.

All types of applicants are eligible to apply, except other Federal agencies, Federally Funded Research and Development Center (FFRDC) Contractors, and nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995.

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B. COST SHARING

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C. OTHER ELIGIBILITY REQUIREMENTS

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PART IV – APPLICATION AND SUBMISSION INFORMATION

A. ADDRESS TO REQUEST APPLICATION PACKAGE.

Application forms and instructions are available at Grants.gov. To access these materials, go to <http://www.grants.gov>, select "Apply for Grants", and then select "Download Application Package". Enter the CFDA and/or the funding opportunity number located on the cover of this announcement and then follow the prompts to download the application package.

NOTE: You will not be able to download the Application Package unless you have installed PureEdge Viewer (See: <http://www.grants.gov/DownloadViewer>).

B. LETTER OF INTENT AND PREAPPLICATION.

1. Letter of Intent.

LETTER OF INTENT DUE DATE: September 4, 2008

A Letter of Intent (LOI) to submit an application is **REQUIRED** and should be submitted by September 4, 2008. **Failure to submit a LOI by an applicant may preclude the full application from due consideration.** The LOI should be submitted electronically by E-mail to: marty.carlin@science.doe.gov and Steve.Eckstrand@science.doe.gov. Please include "Letter of Intent for Announcement DE-PS02-08ER08-29" in the subject line.

The purpose of the LOI is to facilitate the OFES in planning the peer review and the selection of potential reviewers for the proposal. For this purpose, the LOI must include a one-page abstract of the proposed research and list the names and institutional affiliations of Principal Investigators, any Co-Principal Investigators, key investigators, collaborators or consultants, so as to identify any potential conflict of interest in the selection of qualified reviewers for the application.

APPLICATION DUE DATE: September 25, 2008, 8 PM Eastern Time

Applications must be submitted using [Grants.gov](http://www.Grants.gov), the Funding Opportunity Announcement can be found using the CFDA Number, 81.049 or the Funding Opportunity Announcement number, DE-PS02-08ER08-XX. Applicants must follow the instructions and use the forms provided on Grants.gov.

2. Preapplication.

Preapplications are not required.

C. CONTENT AND FORM OF APPLICATION – SF 424 (R&R)

You must complete the mandatory forms and any applicable optional forms (e.g., SF-LLL-Disclosure of Lobbying Activities) in accordance with the instructions on the forms and the additional instructions below. **Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this announcement.**

1. SF 424 (R&R)

Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. To activate the instructions, turn on the “Help Mode” (Icon with the pointer and question mark at the top of the form). The list of certifications and assurances referenced in Field 18 can be found on the Applicant and Recipient Page at <http://grants.pr.doe.gov>, under Certifications and Assurances.

2. RESEARCH AND RELATED Other Project Information.

Complete questions 1 through 5 and attach files. The files must comply with the following instructions:

Project Summary/Abstract (Field 6 on the Form)

The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (e.g., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as the Department may make it available to the public. The project summary must not exceed 1 page when printed using standard 8.5” by 11” paper with 1” margins (top, bottom, left and right) with font not smaller than 11 point. To attach a Project Summary/Abstract, click “Add Attachment.”

Project Narrative (Field 7 on the form)

The project narrative must not exceed twenty pages of technical information, including text and figures, when printed using standard 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) and font not smaller than 11 point.

The page count of 20 does not include the Face Page and Budget Pages, the Title Page, the biographical material and publication information, or any Appendices. However, it is important that the technical information section provide a complete description of the proposed work, because reviewers are not obliged to read the Appendices. Applications exceeding these page limits may be rejected without review. **All applications should be in a single PDF file with the exception of the budgets and Project Summary which must be attached separately in Grants.gov.** The PDF file may also include a few selected publications in an Appendix as background information. In addition, please limit biographical and publication information for the principal investigator and senior personnel to no more than two

pages each. Letters from collaborators should also be included, if applicable. Each principal investigator should provide an E-mail address. To attach a Project Narrative, click “Add Attachment.”

The first page of your narrative must include the following information (this page will not count in the project narrative page limitation):

Applicant/Institution:

Street Address/City/State/Zip:

Principal Investigator:

Postal Address:

Telephone Number:

Email:

Funding Opportunity Announcement Number: DE-PS02-07ER07-29

DOE/Office of Science Program Office: Office of Fusion Energy Sciences

DOE/Office of Science Program Office Technical Contact: Dr. Stephen Eckstrand

DOE Grant Number (if Renewal or Supplemental Application):

Is this a Collaboration? If yes, please list ALL Collaborating Institutions/Pis* and indicate which ones will also be submitting applications. Also indicate the PI who will be the point of contact and coordinator for the combined research activity.

** Note that collaborating grant applications must be submitted separately.*

The project narrative must include:

Executive Summary

Summarize the application in no more than two pages

Background and Recent Accomplishments

- Background – explanation of the importance and relevance of the proposed work
- Recent Accomplishments - this subsection is mandatory for renewal applications and should summarize the proposed work and the actual progress made during the previous funding period.

Proposed Research and Tasks

In addition to the technical description of the proposed work and tasks, include a discussion of the following:

- Verification and Validation (V&V) plans
- Estimate of required high performance computing resources
- Impact of the proposed research on other fields of science, if appropriate
- Project timeline, milestones and deliverables, including tables of quarterly milestones from each collaborating Institution and for each year of the proposed work

Management plan, including work breakdown structure showing the level of effort for each task.

Biographical Sketch Appendix

Provide a biographical sketch for the project director/principal investigator (PD/PI) and each senior/key person listed in Section A on the R&R Budget form. **Provide the biographical sketch information as an appendix to your project narrative. Do not attach a separate file.** The biographical sketch appendix will not count in the project narrative page limitation. The biographical information for each person must not exceed 2 pages when printed on 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) with font not smaller than 11 point and must include:

Education and Training. Undergraduate, graduate and postdoctoral training, provide institution, major/area, degree and year.

Research and Professional Experience: Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

Publications. Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically.

Patents, copyrights and software systems developed may be provided in addition to or substituted for publications.

Synergistic Activities. List no more than 5 professional and scholarly activities related to the effort proposed.

Current and Pending Support Appendix.

Provide a list of all current and pending support (both Federal and non-Federal) for the Project Director/Principal Investigator(s) (PD/PI) and senior/key persons, including subawardees, for ongoing projects and pending applications. For each organization providing support, show the total award amount for the entire award period (including indirect costs) and the number of person-months per year to be devoted to the project by the senior/key person. **Provide the Current and Pending Support as an appendix to your project narrative. Do not attach a separate file.** The Current and Pending Support Appendix will not count in the project narrative page limitation. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review.

Identification of Potential Conflicts of Interest/Bias in Selection of Reviewers Appendix.

Provide the following information in this appendix and append to your project narrative. Do not attach a separate file. (This appendix will not count in the project narrative page limitation):

Collaborators and Co-editors: List in alphabetical order all persons, including their current organizational affiliation, who are, or who have been, collaborators or co-authors with you on a research project, book or book article, report, abstract, or paper during the 48 months preceding the submission of this application. Also, list any individuals who are currently, or have been, co-editors with you on a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of this application. If there are no collaborators or co-editors to report, state “None.”

Graduate and Postdoctoral Advisors and Advisees: List the names and current organizational affiliations of your graduate advisor(s) and principal postdoctoral sponsor(s) during the last 5 years. Also, list the names and current organizational affiliations of your graduate students and postdoctoral associates during the past 5 years.

Bibliography & References Cited Appendix

Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application. **In order to reduce the number of files attached to your application, please provide the Bibliography and References Cited information as an appendix to your project narrative.** This appendix will not count in the project narrative page limitation.

Facilities & Other Resources Appendix This information is used to assess the capability of the organizational resources, including subawardee resources, available to perform the effort proposed. Identify the facilities to be used (Laboratory, Animal, Computer, Office, Clinical and Other). If appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Describe only those resources that are directly applicable to the proposed work. Describe other resources available to the project (e.g., machine shop, electronic shop) and the extent to which they would be available to the project. In order to reduce the number of files attached to your application, please provide the Facility and Other Resource information as an appendix to your project narrative. This appendix will not count in the project narrative page limitation.

Equipment Appendix

List major items of equipment already available for this project and, if appropriate identify location and pertinent capabilities. In order to reduce the number of files attached to your application, please provide the Equipment information as an appendix to your project narrative. This appendix will not count in the project narrative page limitation.

Other Attachment Appendix

If you need to elaborate on your responses to questions 1-5 on the “Other Project Information” document, please provide this information as an appendix to your project narrative. This appendix will not count in the project narrative page limitation.

Do not attach files for fields 8, 9, and 10, instead follow the above instructions to include the information as appendices to the project narrative file.

3. RESEARCH AND RELATED BUDGET.

Complete the Research and Related Budget form in accordance with the instructions on the form (Activate Help Mode to see instructions) and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. You may request funds under any of the categories listed as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this announcement (See PART IV, G).

Budget Justification (Field K on the form).

Provide the required supporting information for the following costs (See R&R Budget instructions): equipment; domestic and foreign travel; participant/trainees; material and supplies; publication; consultant services; ADP/computer services; subaward/consortium/contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost type. Provide any other information you wish to submit to justify your budget request. **Attach a single budget justification file for the entire project period in Field K.** The file automatically carries over to each budget year.

4. SF-LLL Disclosure of Lobbying Activities

If applicable, complete SF- LLL. Applicability: If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the grant/cooperative agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying."

Summary of Required Forms/Files

Your application must include the following documents:

Name of Document	Format	Attach to
SF 424 (R&R)	PureEdge Form	N/A
RESEARCH AND RELATED Other Project Information	PureEdge Form	N/A
Project Summary/Abstract	PDF	Field 6
Project Narrative, including required appendices	PDF	Field 7
RESEARCH & RELATED BUDGET	PureEdge Form	N/A
Budget Justification	PDF	Field K

D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS.

If selected for award, DOE reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to:

- Indirect cost information
- Other budget information
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5)
- Representation of Limited Rights Data and Restricted Software, if applicable
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable

E. SUBMISSION DATES AND TIMES.

1. Preapplication Due Date.

Preapplications are not required.

2. Letter of Intent Due Date.

A Letter of Intent (LOI) to submit an application is **REQUIRED** and should be submitted by September 4, 2008. **Failure to submit a LOI by an applicant may preclude the full application from due consideration.** The LOI should be submitted electronically by E-mail to: marty.carlin@science.doe.gov and Steve.Eckstrand@science.doe.gov. Please include "Letter of Intent for Announcement DE-PS02-08ER08-29" in the subject line.

The purpose of the LOI is to facilitate the OFES in planning the peer review and the selection of potential reviewers for the proposal. For this purpose, the LOI must include a one-page abstract of the proposed research and list the names and institutional affiliations of Principal Investigators, any Co-Principal Investigators, key investigators, collaborators or consultants, so as to identify any potential conflict of interest in the selection of qualified reviewers for the application.

3. Formal Applications.

Formal applications submitted in response to this Announcement must be received by September 25, 2008, 8:00 p.m. Eastern time, to permit timely consideration of awards in Fiscal Year 2009. **You are encouraged to transmit your application well before the deadline. APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.**

F. INTERGOVERNMENTAL REVIEW.

This program is not subject to Executive Order 12372 Intergovernmental Review of Federal Programs.

G. FUNDING RESTRICTIONS.

Cost Principles. Costs must be allowable in accordance with the applicable Federal cost principles referenced in 10 CFR Part 600.

Pre-award Costs. Recipients may charge to an award resulting from this announcement pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 10 CFR Part 600. Recipients must obtain the prior approval of the contracting officer for any pre-award costs that are for periods greater than this 90 day calendar period.

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

1. Where to Submit.

APPLICATIONS MUST BE SUBMITTED THROUGH GRANTS.GOV TO BE CONSIDERED FOR AWARD. Submit electronic applications through the "Apply for Grants" function at www.Grants.gov. If you have problems completing the registration process or submitting your application, call Grants.gov at 1-800-518-4726 or send an email to support@grants.gov.

2. Registration Process.

You must COMPLETE the one-time registration process (all steps) before you can submit your first application through Grants.gov (See www.grants.gov/GetStarted). **We recommend that you start this process at least three weeks before the application due date.** It may take 21 days or more to complete the entire process. Use the Grants.gov Organizational Registration Checklists at <http://www.grants.gov/assets/OrganizationRegCheck.pdf> to guide you through the process. **IMPORTANT:** During the CCR registration process, you will be asked to designate an

E-Business Point of Contact (EBIZ POC). The EBIZ POC must obtain a special password called “Marketing Partner identification Number” (MPIN).

When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e. Grants.gov registration).

3. Application Receipt Notices

After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of five e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. You will know that your application has reached DOE when the AOR receives email Number 5. You will need the Submission Receipt Number (email Number 1) to track a submission. The titles of the five e-mails are:

- Number 1 - Grants.gov Submission Receipt Number
- Number 2 - Grants.gov Submission Validation Receipt for Application Number
- Number 3 - Grants.gov Grantor Agency Retrieval Receipt for Application Number
- Number 4 - Grants.gov Agency Tracking Number Assignment for Application Number
- Number 5 – DOE e-Center Grant Application Received

The last email will contain instructions for the AOR to register with the DOE e-Center. If the AOR is already registered with the DOE e-Center, the title of the last email changes to:

- Number 5 – DOE e-Center Grant Application Received and Matched

This email will contain the direct link to the application in IIPS. The AOR will need to enter their DOE e-Center user id and password to access the application.

PART V - APPLICATION REVIEW INFORMATION

A. CRITERIA

1. Initial Review Criteria.

Prior to a comprehensive merit evaluation, DOE will perform an initial review in accordance with 10 CFR 605.10(b).

2. Merit Review Criteria

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following criteria, listed in descending order of importance as found in 10 CFR Part 605.10 (d), the Office of Science Research Financial Assistance Program. Included with each criterion are the detailed questions that are asked of the reviewers.

1. Scientific and/or technical merit of the project;
 - Does this application address an important problem in fusion energy science?
 - How is the proposed project relevant to the NSTX program goals?
 - How does the proposed research compare with other research in its field, both in terms of scientific and/or technical merit and originality?
 - What is the likelihood that it will lead to new or fundamental advances in its field?

In answering these questions, please identify the topics described in Supplemental Information to which the proposed research will most likely contribute and why.
2. Appropriateness of the proposed method or approach;
 - Are the conceptual framework, methods, and analyses adequately developed and likely to lead to scientifically valid conclusions?
 - Are there significant potential problems and how well does the applicant address these problems?
3. Competency of the applicant's personnel and adequacy of the proposed resources;
 - How well qualified are the applicant's personnel to carry out the proposed research? (If appropriate, please comment on the scientific reputation and quality of recent research by the principal investigator and other key personnel.)
 - Are the applicant's research environment and resources adequate?
 - How does the proposed work take advantage of unique facilities and capabilities and/or make good use of collaborative arrangements?
 - In the case of an application to renew an on-going research project, how effectively has the applicant delivered on the statement of work of this research?
4. Reasonableness and appropriateness of the proposed budget.

The reviewers will also be asked to comment on **Other Appropriate Factors**:

- Could the proposed research make a significant contribution to another fusion concept or another field?
- If applicable, please comment on the educational benefits of the proposed activity.

The evaluation will include program policy factors such as the relevance of the proposed research to the terms of the announcement, the Department's programmatic needs, and quality of previous performance. External peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues. Non-federal reviewers may be used, and submission of an application constitutes agreement that this is acceptable to

the investigator(s) and the submitting institution. Applications found to be scientifically meritorious and programmatically relevant will be selected in consultation with DOE selecting officials depending upon availability of funds in the DOE budget. Funding under this Notice is limited to supporting research activities based in the U.S., though subcontracts with limited funding for collaborators outside the U.S. may be allowed with appropriate justifications. The selected projects will be required to acknowledge support by DOE in all public communications of the research results.

B. REVIEW AND SELECTION PROCESS.

1. Merit Review.

Applications that pass the initial review will be subjected to a merit review in accordance with the guidance provided in the “Office of Science Merit Review System for Financial Assistance.” This Merit Review System is available at:

<http://www.science.doe.gov/grants/merit.html>.

2. Selection. The Selection Official will consider the merit review recommendation, program policy factors, and the amount of funds available.

3. Discussions and Award.

The Government may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 10 CFR part 600 and 605; and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES.

It is anticipated that selections will be completed by December 31, 2008. It is anticipated that awards will be made early in calendar year 2010.

PART VI - AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES.

1. Notice of Selection.

DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See Part IV.G with respect to the allowability of pre-award costs.)

Organizations whose applications have not been selected will be advised as promptly as possible. This notice will explain why the application was not selected.

2. Notice of Award.

A Notice of Financial Assistance Award issued by the contracting officer is the authorizing award document. It normally includes, either as an attachment or by reference: 1. Special Terms and Conditions; 2. Applicable program regulations, if any; 3. Application as approved by DOE; 4. DOE assistance regulations at 10 CFR Part 600, or, for Federal Demonstration Partnership (FDP) institutions, the FDP terms and conditions; 5. National Policy Assurances to Be Incorporated As Award Terms; 6. Budget Summary; and 7. Federal Assistance Reporting Checklist, which identifies the reporting requirements.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS.

1. Administrative Requirements.

The administrative requirements for DOE grants and cooperative agreements are contained in 10 CFR Part 600 and 10 CFR Part 605 (See: <http://ecfr.gpoaccess.gov>), except for grants made to Federal Demonstration Partnership (FDP) institutions. The FDP terms and conditions and DOE FDP agency specific terms and conditions are located on the National Science Foundation web site at http://www.nsf.gov/awards/managing/fed_dem_part.jsp.

2. Special Terms and Conditions and National Policy Requirements.

Special Terms and Conditions and National Policy Requirements.

The DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located at <http://grants.pr.doe.gov>. The National Policy Assurances to Be Incorporated As Award Terms are located at <http://grants.pr.doe.gov>.

Intellectual Property Provisions.

The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at http://www.gc.doe.gov/techtrans/sipp_matrix.html.

C. REPORTING.

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to the award agreement.

PART VII - QUESTIONS/AGENCY CONTACTS

A. QUESTIONS

Questions regarding the content of the announcement must be submitted through the “Submit Question” feature of the DOE Industry Interactive Procurement System (IIPS) at <http://e-center.doe.gov>. Locate the program announcement on IIPS and then click on the “Submit Question” button. Enter required information. You will receive an electronic notification that your question has been answered. DOE will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. DOE cannot answer these questions.

B. AGENCY CONTACT:

Contact: **Dr. Stephen Eckstrand**, Office of Fusion Energy Sciences, SC-24.2
Phone: (301) 903-5546
Fax: (301) 903-4716
E-mail: Steve.Eckstrand@science.doe.gov

PART VIII - OTHER INFORMATION

A. MODIFICATIONS.

Notices of any modifications to this announcement will be posted on Grants.gov and the DOE Industry Interactive Procurement System (IIPS). You can receive an email when a modification or an announcement message is posted by joining the mailing list for this announcement through the link in IIPS. When you download the application at Grants.gov, you can also register to receive notifications of changes through Grants.gov.

B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE.

DOE reserves the right, without qualification, to reject any or all applications received in response to this announcement and to select any application, in whole or in part, as a basis for negotiation and/or award.

C. COMMITMENT OF PUBLIC FUNDS.

The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by other than the Contracting Officer, either explicit or implied, is invalid.

D. PROPRIETARY APPLICATION INFORMATION.

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

“The data contained in pages _____ of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government’s right to use or disclose data obtained without restriction from any source, including the applicant.”

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and marked with a legend similar to the following:

“The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation.”

E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL.

In conducting the merit review evaluation, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM.

Patent Rights. The government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. 42 U.S.C. 5908 provides that title to such inventions vests in the United States, except where 35 U.S.C. 202 provides otherwise for nonprofit organizations or small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions. (See “Notice of Right to Request Patent Waiver” in paragraph G below.)

Rights in Technical Data. Normally, the government has unlimited rights in technical data created under a DOE agreement. Delivery or third party licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE’s own needs or to insure the commercialization of technology developed under a DOE agreement.

G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER.

Applicants may request a waiver of all or any part of the rights of the United States in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this announcement, in advance of or within 30 days after the effective date of the award. Even if such advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver of the rights of the United States in identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance of the award. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784.

Domestic small businesses and domestic nonprofit organizations will receive the patent rights clause at 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act. This clause permits domestic small business and domestic nonprofit organizations to retain title to subject inventions. Therefore, small businesses and nonprofit organizations do not need to request a waiver.

H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES

N/A